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ABSTRACT

This paper provides information on a project by the Uganda Mathematical Society (UMS) that aims to popularize mathematics in Uganda. UMS believes that if parents learn mathematics (primary and secondary), they will be able to help their children themselves instead of hiring others to coach their children as is the practice today. Another way to popularize mathematics according to UMS is to equip teachers with content and skills in teaching so that they teach for understanding what they themselves understand. Another category of adults that the project hopes to serve are those that failed to join university straight from school. Results of a questionnaire to determine the needs of parents, teachers, and mature-age entrants into university are described. (ASK)

# Adults Return to Mathematics: A Proposed Project in Uganda by the Uganda Mathematical Society (UMS)

by
Janet Kaahwa

# ADULTS RETURN TO MATHEMATICS : A PROPOSED PROJECT IN UGANDA BY THE UGANDA MATHEMATICAL SOCIETY(UMS)

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**Introduction**

This project arose out of the need felt by the Uganda Mathematical Society (UMS) to popularise mathematics in Uganda.

Popularisation of the subject is one of the society's major aims.
Mathematics in Uganda is feared and one of the least understood and most disliked subjects in the school curriculum at all levels. Many people confess lack of its knowledge. Parents in particular are not conversant with the mathematics taught in schools and therefore cannot participate in their children's study of the subject. Instead they pass on negative attitudes towards it. And yet schools require that parents play a big positive role in their children's study of the subject positively.
UMS believes that if parents are helped to learn mathematics (primary and secondary) they will be able to help their children with homework. They will have little or no need to pay other people to coach their children as is the practice today.

Another way to popularise mathematics is to equip teachers with content and skills in teaching so that they teach for understanding what they themselves understand. Many mathematics teachers in primary and secondary schools in Uganda join the teaching profession as a last resort. Majority are admitted with low grades in mathematics and insufficient understanding of the concepts they are to teach. Majority of those that join Primary Teacher Training Colleges fail mathematics subject even at college and still graduate as teachers (Kiggundu - Mukasa, 1996)

Another category of adults that the project hopes to serve are those adults that failed to join University straight from school. These can join University under a Mature Age Entrance scheme which requires them to sit qualifying examinations. Mathematics constitutes (30%) of the aptitude paper in the Mature Age University Entrance examination. To prepare for this paper candidates usually take special lessons in mathematics. These lessons are very often offered by people unqualified to teach. Candidates also go through past paper questions.

The project therefore hopes to serve the needs of three categories of adults; parents, teachers and mature age entrants into University in Kampala- the capital city of Uganda. The project will be run as a pilot for a year, to begin with. If after evaluatoin it is found successiful, it will be organised to cater for the whole country.

**The project**

Programmes lasting 3 months, 6 months and 2 months to 2 years in the study of mathematics by adults are being planned. They will be organised and run by UMS.

The project is organised in 7 phases as in the following table:

| Phase | Activity | Time span |
|---|---|---|
| Phase I | proposal write up | 2 months |
| Phase II | Planning and conduction of research | 2 months |
| Phase III | Development of programmes and instructional materials. | 2 months |

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|---|---|---|
| Phase IV | Identification, recruitment and orientation of teacher to teach the programmes. | |
| Phase V | Advertisement of the programmes | 2 months |
| Phase VI | Enrolment of participants plus instruction, assessment and certification | 3 months - 12 months |
| Phase VII | Evaluation of the project | 3 months |

Phase I and II have been completed. They were funded by the society. Phase II involved development of 3 questionnaires one for each category of the target population i.e. the parents, teachers and mature age entrants to University. The questionnaires were administered to 30 parents, 30 Primary school and 30 Secondary school teachers and 30 mature age entrants. They were analysed and the following were the findings:-

**Mature Age Entrant students**
**Mathematical needs**

The mature age questionnaire was answered by 30 mature age entrant students. Of the 30, 2 stopped studying mathematics in Primary Seven, 21 students studied mathematics up to Senior four and 7 went as far as Senior Six.

The two students who stopped learning Mathematics at Primary level enjoyed most Sets, Equations, Percentages, Angles, Statistics, Geometry and Abacus during their study.

They found difficulty in the following topics: Probability, Logic, Distance, Time, Arrival, Departure and Fractions but wanted help with only two of these topics i. e Fractions and Probability. They also wanted help with topics like Ages, Boolean Algebra, Sines, Cosines and Matrices which they did not indicate amongst the difficult topics showing a keen interest in these topics.

The topics that the mature age entrant students who studied Mathematics up to Senior four enjoyed most while at school are Matrices, Statistics, Algebra, Sets, Geometry, Equations, Percentages and Graphs. Those liked by a few students are: indices, Simultaneous equations, Logic, Vectors, Areas, Perimeters, Volumes, Logarithms, Distance, Time, Speed, Probability, Quadratic equations, Shearing, Transformations and Averages.

They found most difficult: Sets, Algebra, Logic, Probability, Percentages, Geometry and Statistics.Topics found difficult by fewer students were: Angles, Pie charts, Logarithms, Pictograms, Circles, Equations, Graphs, Simultaneous equations, Average, Time, Matrices, Indirect proportions, Ratios, Earth, Cosines, Sines, Tabulations, Fractions, Diagrams, Quadratic equations, Integration, Compass construction, Linear equations, Distance, Speed, Time, Co-ordinates, Transformation, 3-dimensional figures, Bases and Factorisation.

The topics that they did not want to be helped with even though they found them difficult are: Pictograms, Earth, Tabulations, Fractions, Linear equations, Bases and Factorisation, showing a disinterest in the topics whereas they wanted help with Formulae showing a keen interest in that topic.

The mature age entrant students who studied Mathematics up to Senior six enjoyed most Co-ordinates, Sets and Equations. A few of these students liked Computation, Identities, Matrices, Statistics, Fractions, Polygons, Algebra, Angles, Graphs, Pictograms, Percentages and Probability.

More students found Equations and Statistics difficult whereas fewer students found Algebra, Geometry, Matrices, Logarithms, Logic, Quadratic equations, Speed, Distance, Angles, Powers, Roots, Measurements, Metrications, Venn diagrams, Sets, Numerical methods, Trigonometry, Mechanics, Computation, Integration and Identities difficult. They wanted help with all the topics they found difficult especially Matrices and also wanted help with Transformation and Graphics which were not among the difficult topics mentioned hence showing a keen interest in them.

Most of the mature age entrant students at the different levels enjoyed most Sets and Equations. Those who stopped Mathematics in Primary 7 and Senior 4 liked in common Percentages the most, and found Probability difficult. However some students at the different levels found difficult Sets and Equations.

**Suggestions about the course to be taken**

The mature age entrants who stopped learning Mathematics in Primary Seven would prefer to take courses leading to the attainment of Certificates of attendance held at 4 - 5 p.m. or 5 - 7 p.m. They prefer them to be held from October - December or from January - March, lasting at least 3 months. These courses should cost at least Ush 10,000 (Uganda shillings (Ush) 1000 is equivalent to 1US$). They find Makerere University the most suitably located venue for this course, and they take this course because they would like to become good Mathematicians and also to be able to explain difficult problems in mathematics.

Most of the students who studied Mathematics up to Senior four would rather take courses leading to the attainment of Certificates of attendance than to a Diploma (which is favoured more than a degree) or a Degree. The courses should be held daily, should last at least 2 months at a cost of SHS 20,000= per month. Most prefer courses to be held July - September and Makerere University as the Venue. They take these courses because they improve their mathematical skills, improve their educational skills, upgrade their stature, enable them to pass mature age exams, achieve more educational skills, equips them with Mathematics for the future, helps them in accounts, helps them to get better employment opportunities, helps them get to know what examiners want.

Those who studied Mathematics up to Senior Six would rather take courses leading to the attainment of Certificates of attendance (favoured by most students), Degrees and Diplomas though one student would rather not attain a Certificate. Most of them want the courses to be held at 5 - 7 p.m. taken daily or 3 days a week. More students favoured the period December - March. They all want a course that will last at least 2 months even though most voted for 4 months. Most wanted the courses to be held on Makerere University Campus preferably the Adult Education Centre though one student would like them to be held at the nearest school centres. Two students would rather the course cost 100,000= per term whereas the other students preferred the cost of at most 30,000 per term. They want to take these courses to upgrade their stature, pass aptitude exam, improve their skills, as a preparation for exams and also widen their educational knowledge.

**Parents**

**Mathematical needs**

30 parents answered the questionnaire. They consisted of 22 parents often asked for help in Mathematics by their children and 8 often not asked. One parent stopped studying Mathematics at primary level, 17 went as far as O level whereas 12 reached A level.

Most parents wish to be helped with Equations, Algebra, Bases, Sets, Geometry, Probability, Graphs and Business accounting. Four parents have not yet grasped the language and therefore want help in all the topics. They also wanted help in Bearing, Angles, Fractions, Proportions, Multiplication, Logic, Pie Charts, Percentages, Fractions, Statistics, Vectors, Mechanics, Transformation, Circles,

Logarithms and Integers. Two parents wanted help in both Primary and Secondary Mathematics, 22 wanted help in Secondary Mathematics and only 4 wanted help in Primary Mathematics.

**Suggestions about the course to be taken**

They would like to take courses leading to the attainment of Certificates of attendance (favoured by most) and Diplomas. Most parents prefer to take these courses from 5 - 7 p.m. because this is the time when they are free. A few are free from 3 - 5 p.m. and 4 - 6 p.m. One parent prefers this time interval because that is when he has a fresh mind. 15 parents prefer the courses to be held daily whereas the others do not. 3 parents find the duration of 2 hours too long.

They would like these courses to cost from Ush20,000 to Ush100,000 per term whereas 1 parent suggests the cost of Ush5,000 per term. Most parents find Makerere University most easily accessible whereas the others prefer Shimoni Demonstration school, Lugogo show grounds, Kireka centre for handicapped, YWCA, Najjanankumbi Adventist school, Kyikerekera nursery school, any TTCs or NTCs, YMCA and ITEK. They find these courses beneficial because they help them in assisting their children in case of problems, assist others in this field, improve mathematics skills, increase the knowledge they have in the subject, for part time teaching and in their professions.

## Teachers

**Mathematical needs**

54 teachers answered the teachers questionnaire. 29 of them are primary teachers, 7 are O' level secondary teachers and 18 are A' level secondary teachers.

There are more male teachers than female teachers in primary. Of the 29 who answered the questionnaire, 25 are male. Most of the primary school teachers lie in the age group 30 - 39 whereas a few lie in the age group 20 - 29 and only 2 are above 39. Most of these teachers have a Grade III certificate or a Diploma. The others had Credit six certificate, A level certificate, B++ certificate, Pass 5 O level certificate, D2 O' level certificate and a P.7 certificate. One of them is still a student. 17 of these teachers attained these qualifications in the 1990s, 10 in the 1980s and 1 in 1978.

The teachers find problems with teaching Solution sets, how to find inverse and compound proportions, applications of LCM and Finites, trigonometry, successive events and sample space in Statistics, working out Areas, Perimeters and Circumference without a formula, finding the nth term in Progression, Perpendiculars (line bisectors), application of Fractions, construction of Square roots, following clear steps in Wordy topics, construction of Angles, use of and drawing scales in Bearing, application of the table book, properties of Geometry, metric system, construction of figures, integers, probability and operation/comparison of the 12 and 24 hour clock. Some have little knowledge in Solution sets, Algebra, formation of Equations and applications .

For the O' level teachers, 1 is female. All the teachers lie in the age group 20 - 29. They have either a Diploma, A' level certificate or Degree Certificate except for one who is an undergraduate. They all achieved these awards in the 1990s showing how up to date these qualifications are.

They find problems in teaching Permutations and Combinations because the topics are complicated, Translations and Earth because they are very wordy, Geometry measuring angles, forming inequalities and finding maximum values in Linear programming, getting angles and distances in Bearing and getting angles between 2 planes in 3 - dimensional geometry. They were not properly taught Mechanics, Conics and Solids of revolution. There are also few teachers of Mechanics, Vectors and, Permutations and Combinations.

Only 1 of the A' level teachers was female. All these teachers lie in the age group 20 - 40. They all have either a Diploma, Post-Graduate-Diploma in Education or Degree except for 1 undergraduate, and they all achieved their qualifications in the 1990s showing how up to date they are.

They find problems in teaching how to use construction method to find shortest distance, development of model and circular motion in Projectiles, Jointed rods, modelling all the equations in Simple Harmonic Motion, 3 - dimensional geometry, word problems in Integers, Linear Algebra, Ellipse and Hyperbola and extraction of the mathematical problem and testing for optimality in Linear Programming. They have problems with Mechanics because there are no good teachers of mechanics. 5 of these teachers did not have problems and hence did not need help in any of the topics.

**Suggestions about the course to be taken**

Most of the Primary teachers prefer to take courses leading to the attainment of Certificates of attendance, Diplomas and Degrees. The others want awards of prizes, money, and bicycles. All the teachers would still attend the course if these awards were given by UMS. Most of them want the courses to be held at 3 - 5 p.m., 4 - 6 p.m., 5 - 7 p.m. and 11 a.m. - 1 p.m. 1 teacher would like the course to be held at 8 - 11 a.m. whereas another teacher at 9 - 12 a.m. 7 of these teachers find the duration of 2 hours too short for the course and 3 teachers find it too long. The others find the time adequate duration for the course. Most teachers favour the course to be held daily and 3 times a week, and should cost about Ush5,000= per month. 1 teacher suggests government sponsorship. Most teachers find Makerere University, ITEK, Bat valley and Nakivubo teachers' centre the most suitable.

All the O' level secondary school teachers would like to achieve certificates of attendance upon completion of the course and only 2 would not attend the course if the award is to be given by the UMS. Other than 1 teacher, the others wanted the course to be held at 3 - 5 p.m. and 4 - 6 p.m. Most teachers considered the duration of 2 hours enough for them while the others considered it too long. Most teachers were in favour of holding the course daily and 3 times a week and found any place around Kampala city suitably located whereas 1 teacher was in favour of Makerere University and another Bethel's children's centre. They wanted a cost of at least Ush6,000= per week.

The A' level secondary teachers would like to achieve either a Certificate of attendance or Degree upon completion of the course and would still attend the course were the awards to be given by the UMS. Only 1 teacher would like the course to be held at 3 - 5 p.m. The others preferred 4 - 6 p.m. and 5 - 7 p.m. Only 1 teacher considered the duration of 2 hours too long, the others considered it adequate. Most teachers preferred the course to be 3 times a week whereas the others daily, 2 times a week and odd days of the week and should cost at least Ush2,000= per month. Most teachers found the Makerere University campus suitable venue.

Summary

To be able to cater for every student's Mathematical needs, there is need to divide the students class into three because they are at different levels of Mathematics. And in developing a curricula of courses that will produce mature age students who can pass the aptitude paper, parents who will be able to help their children with homework and teachers who will not find it difficult to teach mathematics, the Uganda Mathematical Society should design a programme that will put into consideration all the topics that students found difficult while at school and in those topics that appear in the aptitude paper.

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The society is therefore going on to PhaseIII which will involve development of three programmes, one for each category of the target group.

Twelve experienced teachers and mathematicians are to be identified - and sensitised about the project (its aims and target group) in a one day workshop. They will then spend two days writing out programmes. They will spend another two weeks developing instructional materials for use by the teacher of the programmes.

successful completion of phase III will usher the project into phase IV which will involve orientation of teacher of programmes. Facilitators conversant in mathematics and methods in adult teaching will be hired from within and/or without Uganda) for this purpose.

Phase V will involve advertising the programmes on radio, television, newspapers and circular letters to institutions and posters.

Phase IV will involve enrolment of students- thirty or more students per category.

Instruction assessment and certification will characterise phase VI.

Evaluation of the project will be done during Phase VII. If the project is found successful and worthwhile and the programmes found viable, the programmes will be revised and become a regular offering of UMS thereafter.

Strategies for implementation

A committee of three developed the project proposal. A baseline study was carried out to find out what mathematics the target groups need, their willingness to sponsor themselves for the course, the time they would like the courses to be offered and the kind of certification they would like to be offered on successful completion of the courses.

A panel of qualified personnel from University, National Curriculum Development Centre (NCDC) and Institute of Teacher Education, Kyambogo (ITEK) are to be identified to develop curricula and write programmes.

The UMS executive committee in consultation with elder members of the society will appoint a management committee. The functions of the management committee will be to identify teachers of the programme, premises, prepare timetables, administer and appoint a director of studies and assistant(s) to supervise the programmes' activities.

Funding:

The society is seeking for sponsors to offer initial funds for the project. This will boost and start off the project. The project should eventually be self-sustaining . The society has managed so far to fund the 1st two phases of the project.

UMS hopes to expand this project to reach other adults that need to study mathematics all over the country by developing programmes for other specific categories of adults. It plans to extend similar services to adults in other parts of the country through the UMS regions already set up in different parts of the country.

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ADULTS LEARNING MATHS
A RESEARCH FORUM (ALM)

# ADULTS RETURN TO MATHEMATICS: A PROPOSED PROJECT IN UGANDA BY THE UGANDA MATHEMATICAL SOCIETY (UMS)

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UGANDA MATHEMATICAL SOCIETY

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